

Protection and control

Sepam range **Sepam 1000** Installation



GROUPE SCHNEIDER

■ Merlin Gerin ■ Modicon ■ Square D ■ Telemecanique

Contents

	page
equipment identification	3
installation of Sepam 1000	3
Sepam 1000	3
accessories supplied with Sepam	3
assembly and wiring	4
dimensions and drilling	4
assembly	4
composition of Sepam 1000	5
terminal identification principle	5
connections	5
connection of current inputs to 1 A or 5 A CTs	6
1 A or 5 A CT block and connection diagram	6
selection of operating modes (SW1 and SW2)	6
setting of microswitches SW1 and SW2 on EM module	6
CCA 660 or CCA 650 connector	7
connection of current inputs to CSPs	8
CSP connection diagram	8
selection of operating modes (SW1 and SW2)	9
microswitch setting chart	9
use of CSH 120 and CSH 200 core balance CTs	10
CSH 120 and CSH 200 connection diagram	10
selection of operating mode (SW1)	10
assembly	11
cabling	11
use of the CSH 30 interposing ring CT	12
cabling	12
connection to the 1 A secondary circuit	13
connection to the 5 A secondary circuit	13
selection of operating mode (SW1)	13
connection of voltage inputs	14
connection of 3 VTs	14
connection of 3 VTs (residual voltage measurement)	14
connection of 2 VTs	15
connection of 1 VT	15
connection of residual voltage input	15
selection of operating mode (SW1)	16
connection of power supply and logic inputs and outputs	17
connection of power supply and earth	17
connection of logic inputs and outputs	17
selection of operating mode (SW1)	18
checking prior to commissioning	19
checks	19
microswitch setting on rear of device	19

Equipment identification

Installation of Sepam 1000

Each Sepam 1000 comes in a single package which contains:

- Sepam,
- mounting accessories,
- connection accessories (connectors).

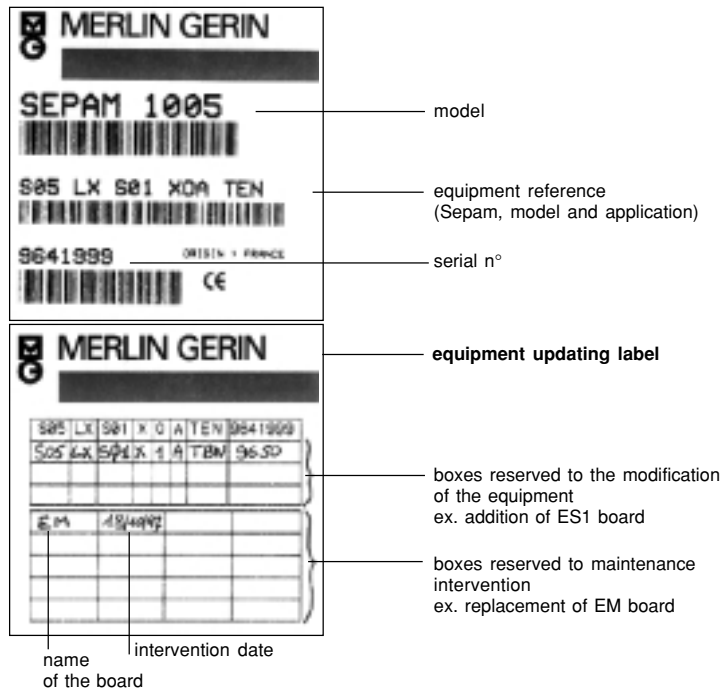
The other optional accessories come in a separate package.

We recommend that you follow the instructions given in this document for quick, correct installation of your Sepam 1000:

- equipment identification,
- assembly,
- connection of current and voltage inputs,
- microswitch setting,
- connection of power supply and earth,
- checking prior to energizing.

Sepam 1000

To identify Sepam, check the label on the right side of the device which gives the product's functional and hardware characteristics.



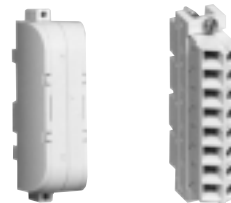
Example of a label on the right side of Sepam.

Accessories supplied with Sepam

Each Sepam comes with the following accessories.

CCA 660 or CCA 650 connector (Sepam CT) ⁽¹⁾ for connection of the CT 1 A or 5 A :

- for 4 mm eye lugs,
- for max 6 mm² cable (AWG 10).



CCA 608 connector
8 points.
Connection of VTs:
■ screw terminals,
■ 0.6 to 2.5 mm² wire (AWG 20 to AWG 14).

CCA 604 connector
4 points.
■ screw terminals,
■ 0.6 to 2.5 mm² wire (AWG 20 to AWG 14).



2 Sepam mounting lugs

CCA 606 connector
6 points.
■ screw terminals,
■ 0.6 to 2.5 mm² wire (AWG 20 to AWG 14).

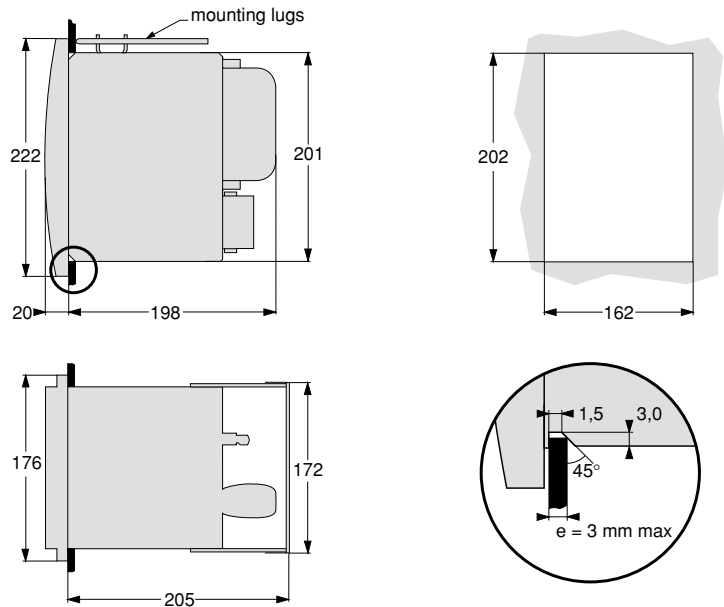


⁽¹⁾ for CS Sepams, a CCA 601 BNC/BNC cable, 4 m long, is supplied for connection to the CSP sensors.

Assembly and wiring

Dimensions and drilling

Drilling diagram

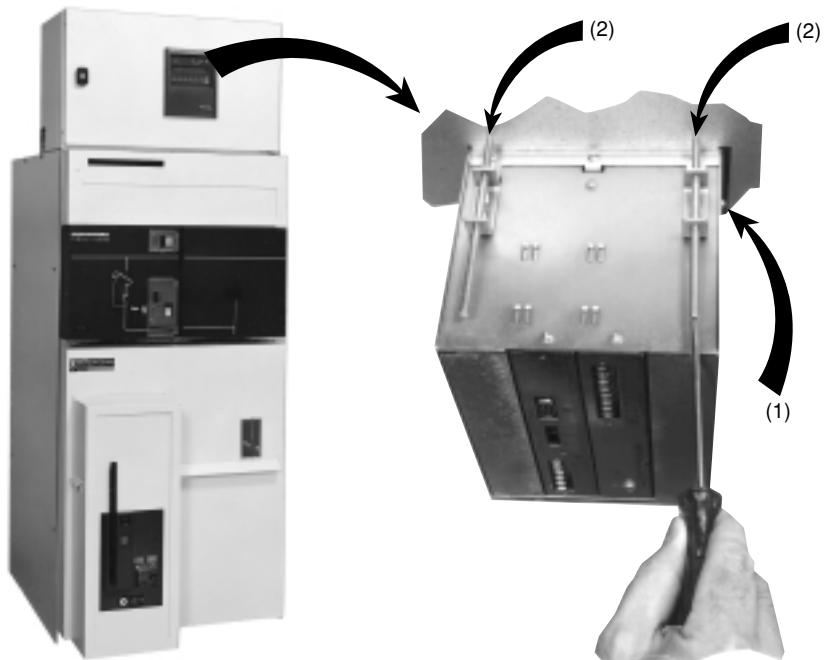


Assembly

■ insert Sepam through the front of the cut-out. Slide it into the cut-out until the front of Sepam is in contact with the mounting plate. The 2 notches (1) at the base of the Sepam case allow it to hold by its own weight.

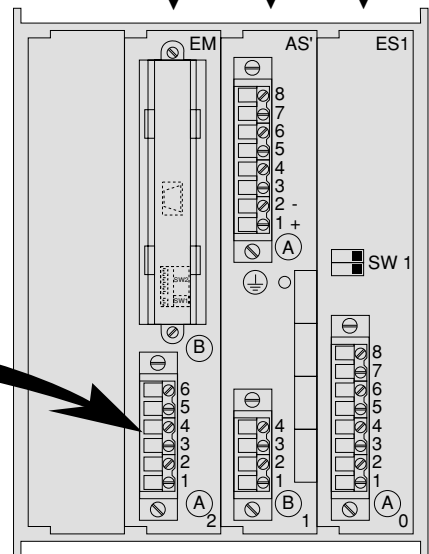
■ position the 2 lugs (2) in the holes on the top of Sepam. Tighten the threaded studs of the lugs.

■ make sure not to block the ventilation openings on the top and bottom of Sepam. Leave a space of at least 5 cm above and below Sepam.



Composition of Sepam 1000

- slot 0 — optional 1 input/ 3 output module (ES1)
- slot 1 — power supply / 2 output module (AS')
- slot 2 — analog input module
 - Current measured by CT (EM);
 - Current measured by CSP sensor (EA);
 - Voltage (ET)



Terminal identification principle

All the Sepam 1000 connection terminals are located on the rear of the device.

The Sepam 1000 modules are fitted into slots numbered 0 to 2 on the back.

The connections are identified by adding different markings.

Slot (0 to 2), connector A or B, terminal (1 to 8).

example: 2 A 4
slot n° 2, connector A, terminal A.

Connections

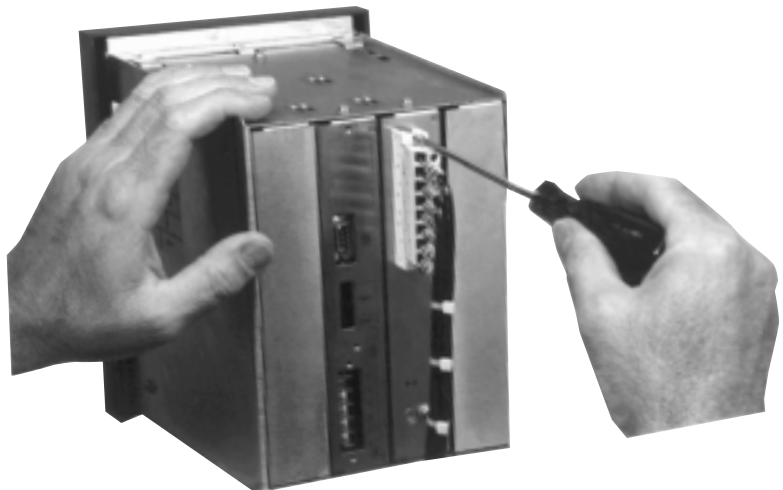
All the Sepam 1000 connections are made on the removable connectors on the rear of the device. All the connectors are screw-lockable.

Wiring of screw connectors:

- recommended wire fitting:
 - Telemecanique DZ5CE0155 for 1.5 mm²,
 - DZ5CE0253 for 2.5 mm².

Stripped length with fitting: 17 mm,

- without fitting:
 - stripped length: 10 to 12 mm,
 - maximum 2 wires per terminal.

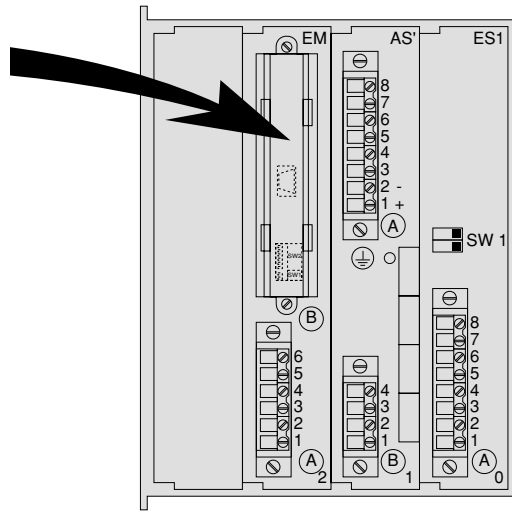


Connection of current inputs to 1 A or 5 A CTs

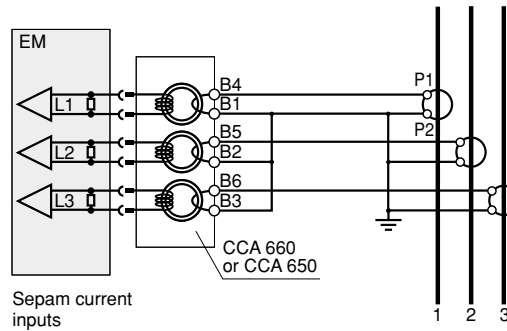
The current transformer (1 A or 5 A) secondary circuits are connected to the CCA 660 or CCA 650 connector on the EM module.

This connector contains 3 core balance CT primary crossing adapters to ensure impedance matching and isolation between the 1 A or 5 A circuits and Sepam 1000.

The connector may be disconnected with the power on since disconnection does not open the CT's secondary circuit.



1 A or 5 A CT block and connection diagram

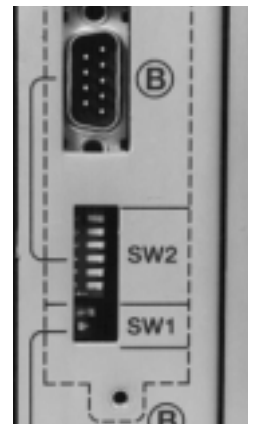


Selection of operating modes (microswitches SW1 and SW2)

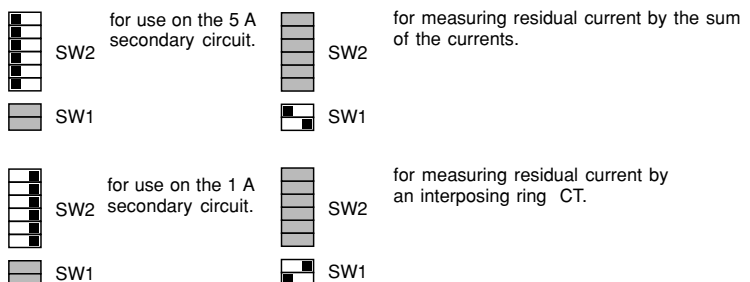
Sepam 1000 has several possible current input operating modes. The operating mode is selected via the microswitches on the rear of the device. They must be set before Sepam is switched on.

The microswitches must be set while Sepam is de-energized.

The microswitches are hidden by the CCA 660 or CCA 650 connector once it has been installed.

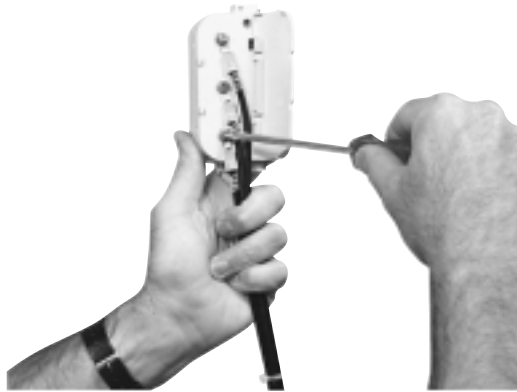


Setting of microswitches SW1 and SW2 on the EM module (slot 2)

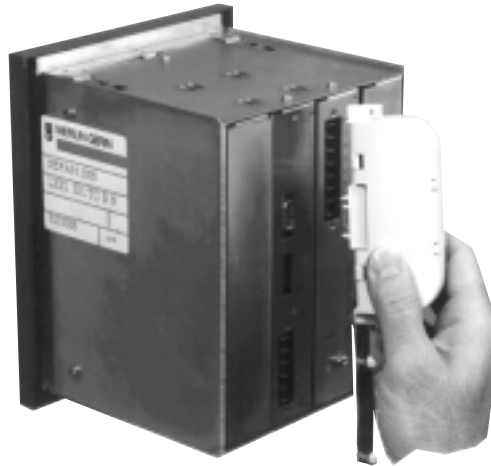


CCA 660 or CCA 650 Connector

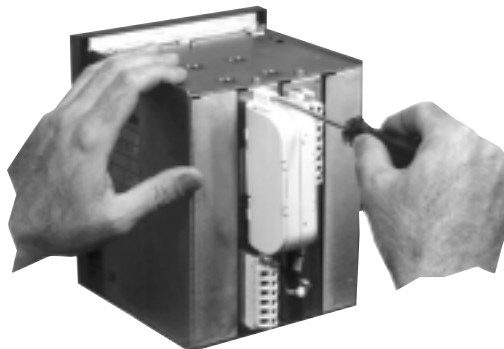
- Open the 2 side shields for access to the connection terminals. The shields may be removed, if necessary, to facilitate wiring. If removed, replace them after wiring.
- Remove the bridging strap if necessary. The strap links terminals 1, 2 and 3.
- Connect the wires using 4 mm eye lugs. The connector accommodates wires with cross sections of 1.5 to 6 mm² (AWG 16 to AWG 10).
- Close the side shields.



- Plug the connector into the 9-point inlet on the rear of the device. Item B on the EM module (slot 2).



- Tighten the CT connector fastening screws on the rear of Sepam.



N.B. To disconnect the current inputs with the system on line, never disconnect the wires; unplug the CT connector from the rear of Sepam.

Connection of current inputs to CSPs

The CSP sensors are connected by prefabricated coaxial cables, part no. CCA 601 (4 m long) which are to be ordered with the CSP sensors. The cables are fitted with 2 BNC type connectors.

The cables are plugged into:

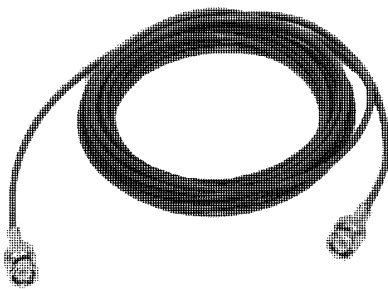
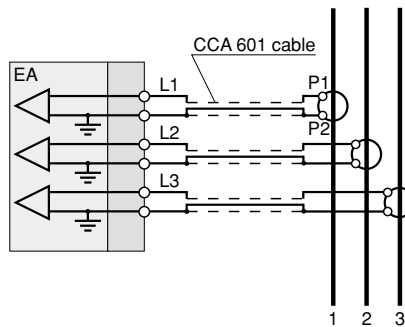
- Sepam 1000, in the BNC inlets on the rear of the device, identified L1, L2 and L3, on the EA modules (slot 2),
- the CSP sensors, in the BNC outlet on each sensor.



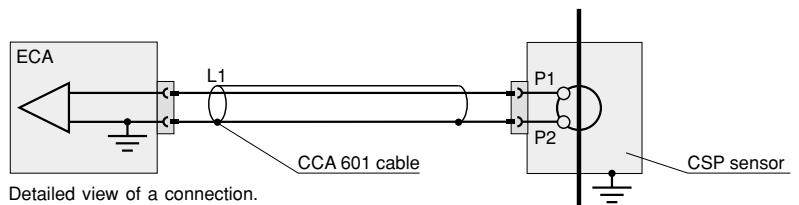
CSP connection diagram

The CCA 601 cable shielding is earthed naturally by the connection to Sepam 1000's BNC inlets. Do not earth by any other means.

The CSP sensors should be earthed via the earthing screw on the side of the device.



CCA 601 cable.



Selection of operating modes (microswitches SW1 and SW2)

The operating mode is selected by setting the microswitches on the rear of the device. They must be set before Sepam 1000 is switched on, while it is de-energized.



Set microswitches SW1 and SW2 on the EA module (slot 2) in accordance with the chart opposite.

They are to be set according to:

- the CSP model used (30 A-300 A, 160 A-1600 A, 500 A-2500 A),
- the rated current of the protected system,
- the residual current measurement method (sum or core balance CT).

N.B. When the rated current of the electrical system to be protected does not appear in the chart, choose the column that corresponds to the current rating immediately above.

Microswitch setting chart

SW2 setting										
30	36	45	60	75	90	120	150	180	225	300
160	192	240	320	400	480	640	800	960	1200	1600
500	600	750	1000	1250	1500	2000	2500			

SW2: for selection of the phase current range

0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1

SW1 setting

SW1 : residual current measured by the sum of the phase currents

0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1

SW1: residual current measured by core balance CT

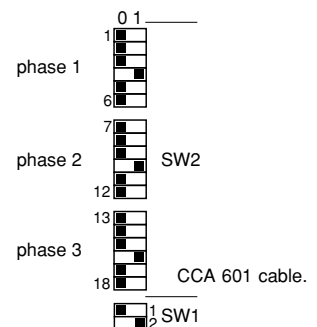
0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1

CSP sensor 31-10 : 30-300 A.
 CSP sensor 33-10 : 160-1600 A.
 CSP sensor 34-10 : 500-2500 A.

Example of microswitch setting

This example indicates the microswitch setting in the following case:

- system rated current: 160 A.
- CSP sensor used: 160-1600 A model.
- residual current measured by the sum of the 3 phase currents.



Use of CSH 120 and CSH 200 core balance CTs

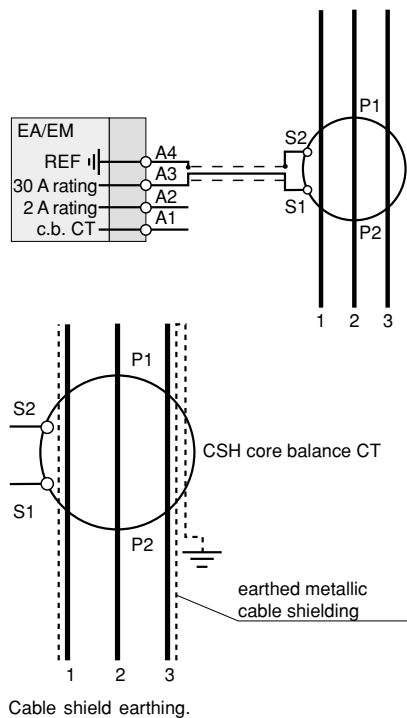
The only difference between the CSH 120 and CSH 200 core balance CTs is their inner diameter (120 mm and 200 mm). Due to their low voltage isolation, they may only be used on cables.



CSH 120 and CSH 200 connection diagram

To measure residual current up to 20 A, connect the core balance CT to the "2A rating" input.

To measure residual current up to 300 A, connect the core balance CT to the "30A rating" input.



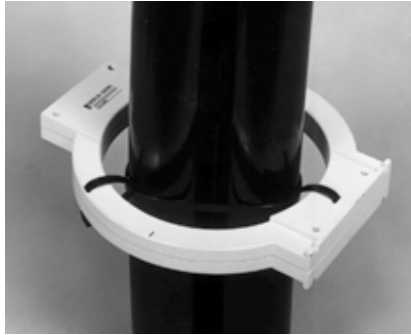
Selection of operating mode (SW1 microswitches)

Set the corresponding Sepam 1000 microswitches. The microswitches concerned (SW1) are found on the EM or EA module (slot 2). Refer to the chapter entitled "connection of current inputs", "selection of operating modes".

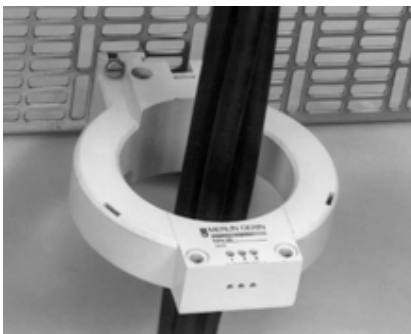


Setting for measuring residual current via a core balance CT.

Assembly



Assembly on MV cables.

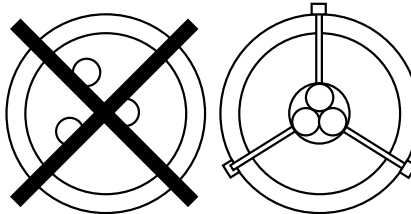


Assembly on mounting plate

Group the MV cable (or cables) in the middle of the core balance CT.

Use non-conductive binding to hold the cable.

Remember to insert the 3 medium voltage cable shielding earthing cable through the core balance CT.



Cabling

The CSH 120 or CSH 200 core balance CT is connected to the CCA 606 6-point connector (item B) on the current input module.

Recommended cable:

- sheathed, shielded cable,
- min. cable cross-section 0.93 mm² (AWG 18),
- resistance per unit length < 100 milli ohms/m,
- min. dielectric strength: 1000 V.

Connect the connection cable shielding in the shortest manner possible to the Sepam 1000 2 A 4 terminal.

Flatten the connection cable shielding against the metal frames of the cubicle.

The cable shielding is grounded in Sepam 1000.

Do not ground the cable by any other means.

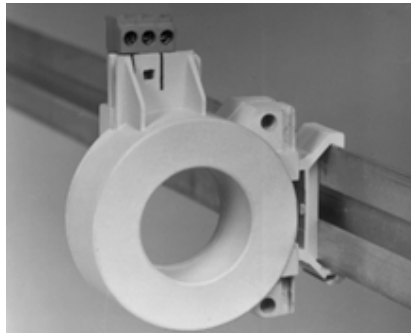
Maximum resistance of Sepam connection wiring

rating used	max. resistance
30 A	4 Ω
2 A	10 Ω

Use of the CSH 30 interposing ring CT

The CSH 30 interposing ring CT should be used when residual current is measured by a current transformer with a secondary circuit (1 A or 5 A). It acts as an interface between the current transformer and the Sepam 1000 residual current input.

The CSH 30 interposing ring CT is mounted on a symmetric DIN rail. It may also be mounted on the plate by means of the mounting holes on the base.



Cabling

The secondary winding of the CSH 30 is connected to the CCA 606 connector.

Cable to be used:

- sheathed, shielded cable,
- min. cable cross-section 0.93 mm² (AWG 18) (max. 2.5 mm²),
- resistance per unit length < 100 mΩ/m,
- min. dielectric strength: 1000V.

Connect the CSH 30 interposing ring CT connection cable shielding in the shortest manner possible to the 2 A 4 terminal.

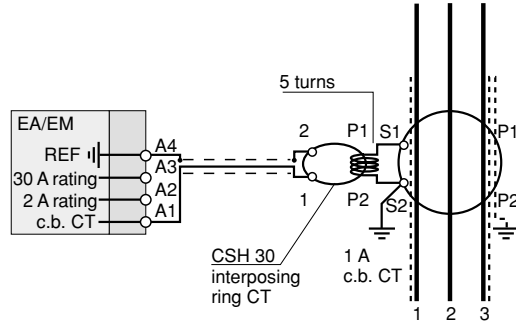
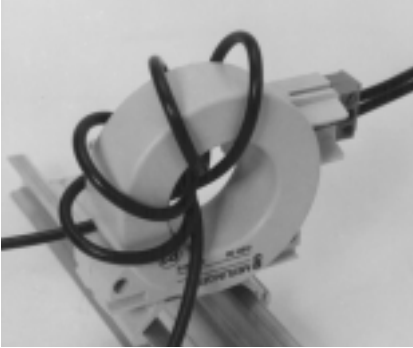
Flatten the cable against the metal frames of the cubicle.

The connection cable shielding is grounded in Sepam 1000.

Do not ground the cable by any other means.

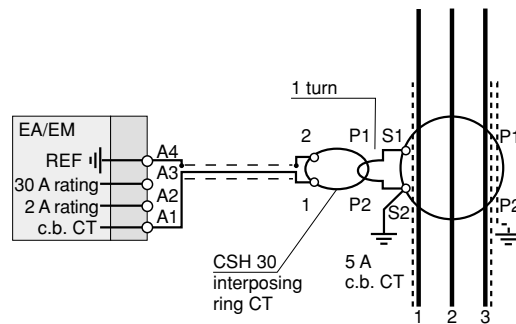
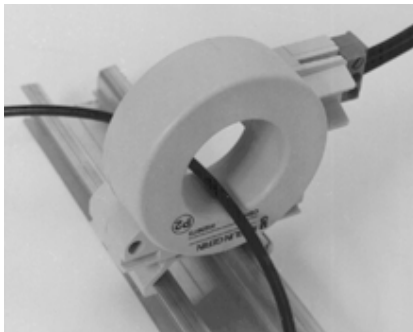
The CSH 30 interposing ring CT must be installed close to the Sepam (Sepam CSH 30 link less than 2 m long).

Connection to 1 A secondary circuit



- plug into the CCA 606 connector.
- wind the transformer secondary wire 5 times around the CSH 30 interposing ring CT.

Connection to 5 A secondary circuit



- plug into the CCA 606 connector.
- wind the transformer secondary wire once around the CSH 30 interposing ring CT.

Selection of operating modes (SW1 microswitches)



Setting for measuring residual current by an interposing ring CT.

Set the SW1 microswitches, referring to the chapter entitled "connection of current inputs", in the "selection of operating modes" section.

Connection of voltage inputs

This concerns types of Sepam 1000s that have voltage inputs.

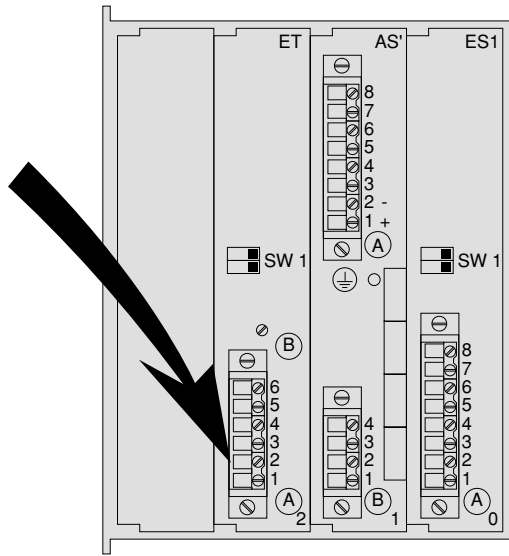
Type TX.

Phase and residual voltage transformers (VTs) are connected to the CCA 606 6-point connector on the ET module. Sepam 1000 can function with 1, 2 or 3 VTs.

Residual voltage can be measured by two methods:

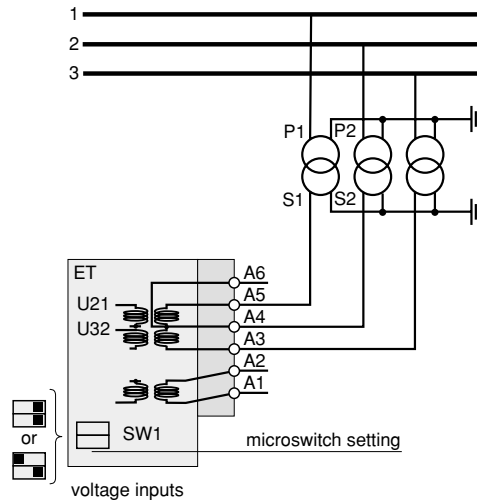
- calculated by Sepam 1000 based on the phase voltages,

- wired directly to Sepam 1000 from a transformer with open delta-star windings.



Connection of 3 VTs

This arrangement doesn't allow for residual voltage measurement by the sum of the 3 phase voltages.

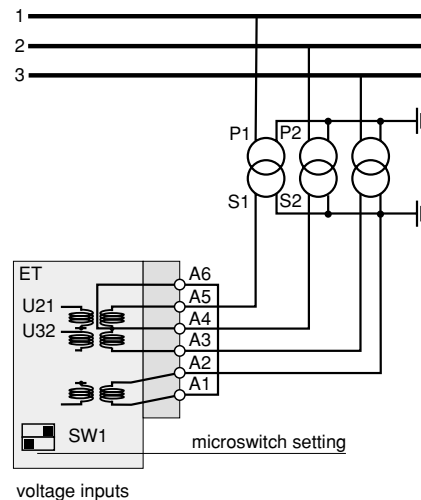


Connection of 3 VTs (measurement of residual voltage)

This arrangement is used for Sepam 1000 to measure phase-to-phase voltages U21 and U32 and to calculate residual voltage based on the VT secondary voltages.

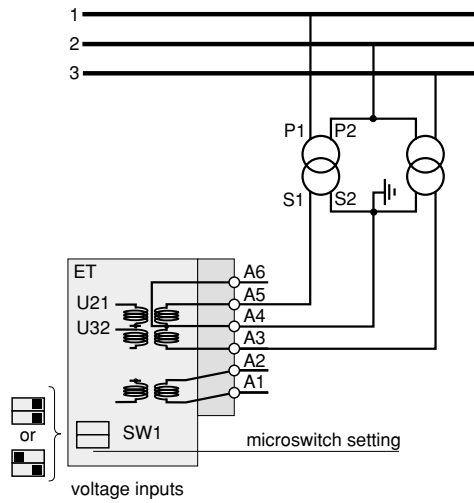
It requires the use of 3 VTs with the primary between phase and earth.

Terminals 1 and 6 must be strapped in order for Sepam to calculate residual voltage.



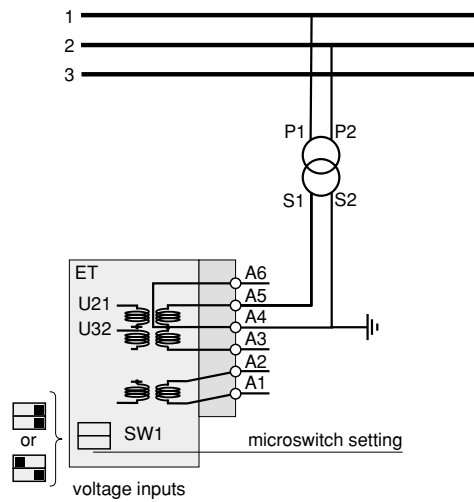
Connection of 2 VTs

This arrangement does not allow residual voltage to be measured by the sum of the 3 phase voltages.



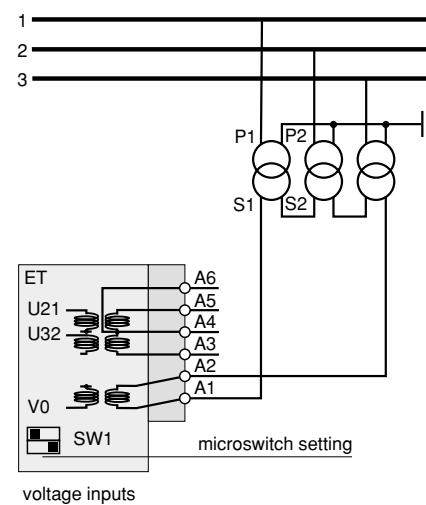
Connection of 1 VT

This arrangement does not allow residual voltage to be measured by the sum of the 3 phase voltages.



Connection of the residual current input

This arrangement is used to connect the residual voltage measured outside Sepam 1000 via a transformer with open delta-star windings. The connection is made on terminals A1 and A2 of the 6-point connector.

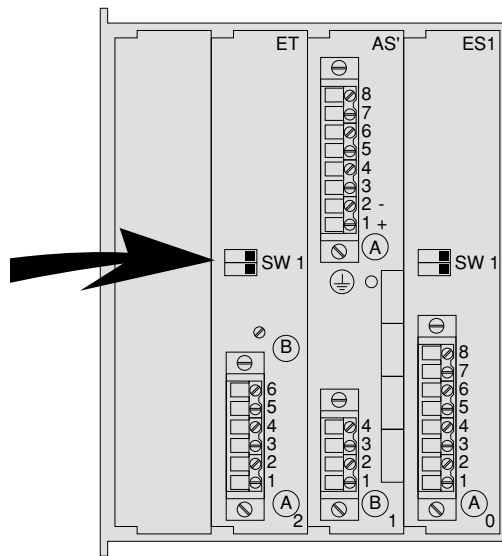


Connection of voltage inputs (cont'd)

Selection of operating mode (SW1 microswitches)

The voltage input connection subassembly has 2 microswitches (2) that must be set according to the connection diagram being used. The microswitch setting is indicated in each of the preceding connection diagrams.

The microswitches must be set before Sepam 1000 is switched on, while it is de-energized.



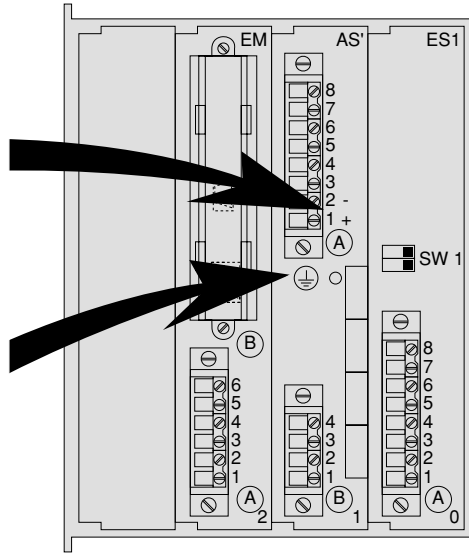
Connection of power supply and inputs and outputs

Connection of power supply and earth

The Sepam 1000 power supply is connected to the CCA 604 4-point terminal block on the AS' module situated on the rear of the device. The power supply input is protected against accidental polarity inversion.

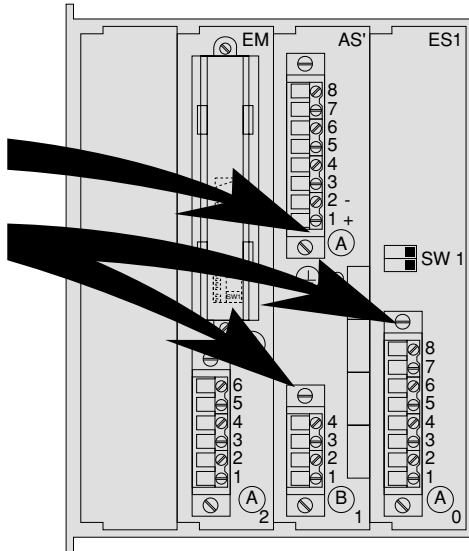
The Sepam 1000 chassis must be earthed via the grounding screw situated on the AS' module.

Use a braid or cable fitted with a 4 mm eye lug. The eye lug fastening screw is already mounted on Sepam when it is delivered. (Should the screw be lost, never replace it by a screw longer than 8 mm).

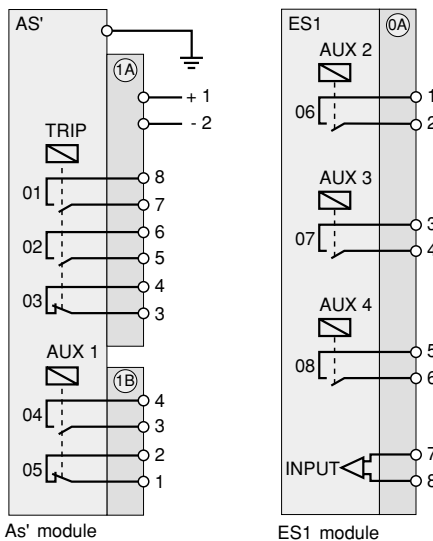


Connection of logic inputs and outputs

The logic information is connected to the CCA 608 and 604 connectors on the AS' and ES1 modules.



Cabling should be in accordance with the diagram for your application..

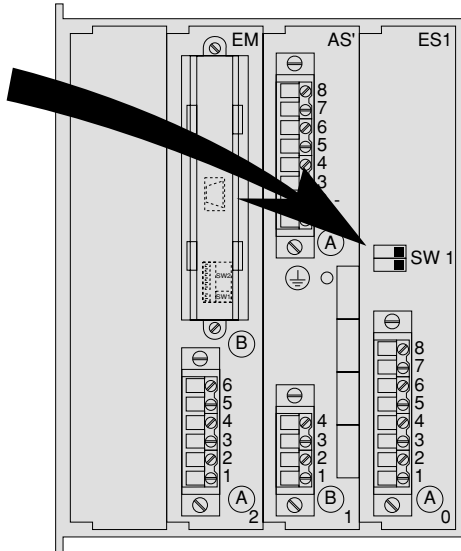



Connection of power supply and logic inputs and outputs (cont'd)

Selection of operating modes (SW1 microswitches)

The ES1 module has 2 SW1 microswitches that must be set to determine the logic input operating mode.

The microswitches must be set before Sepam is switched on, while it is de-energized.



	0 status guar.	1 status guar.	
0 1	6.0 Vdc	14.0 Vdc	setting to be used for 24 to 30 Vdc supply voltages
 SW1	4.2 Vac	10.0 Vac	
	25.4 Vdc	33.6 Vdc	setting to be used for 48 to 250 Vdc or 100 to 240 Vac supply voltages
0 1	18.0 Vac	23.8 Vac	

Checking prior to commissioning

Checks

These operations should be carried out before Sepam 1000 is energized.

Supply voltage

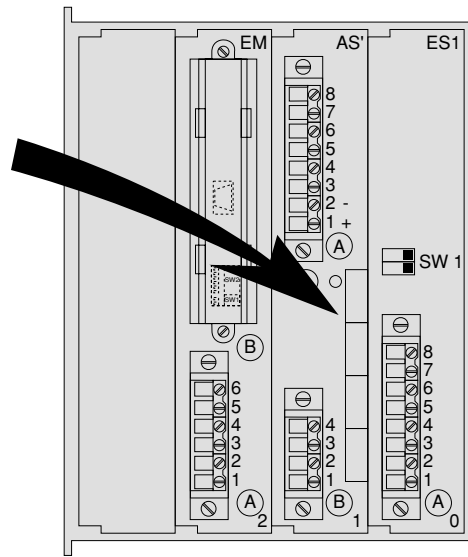
Ensure that the cubicle auxiliary power supply has the same operating voltage as Sepam 1000. It is indicated on the rear of the device, beside the power supply connector, by a point in the box corresponding to voltage.

Earthing

Check that the Sepam 1000 chassis is earthed by the grounding nut situated on the AS' module. Check that the screw has been tightened.

Connectors

Check that all the connectors on the rear of the device are correctly plugged in and screw-locked.



Microswitch setting on rear of device

Check that the microswitches used to set the Sepam 1000 operating mode and calibrations are correctly set (pushed to the limit on the left or right so as to avoid random setting). The settings are given in the chapters related to the connection of the different inputs.

- "connection of current inputs to 1 A or 5 A CTs",
- "connection of voltage inputs",
- "connection of logic inputs and outputs", the microswitches must be set while Sepam is de-energized.

If the microswitches are incorrectly set, the measurements supplied by Sepam will be erroneous and the protections will not trip at the required set points.

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